

## AERONAUTICS

# Toy Shelf to Stratosphere

**Weather balloons blown behind the Iron Curtain have roused new interest in old sport. Balloons today are used for weather observation, propaganda, and reconnaissance.**

By HENRY WHITE PIERCE

► SOMEWHERE IN Europe a balloon drifts eastward to accomplish its mission in the battle for men's minds.

From a lonely desert outpost a dozen scientists watch a balloon float skyward to snatch hidden facts from the upper atmosphere.

And in the heart of a large city a bright red balloon fluttering at the end of a piece of twine delights a small boy.

Physicists, engineers, geographers and even doctors use balloons every day. But the high-flying bags were originally used more for sport than science. The balloon has evolved from a harum-scarum adventurer's toy to play a vital part in what may be the world's most deadly game.

What balloons have lost in popular play they have gained in scientific application. Pilotless, they soar 25 miles into the thin stratosphere to take weather readings. Rockets launched from the big gas bags attain even higher altitudes. Balloons are used in mapping, for wartime air cover and to carry freedom messages behind the Iron Curtain.

New developments in ballooning are continually being disclosed. The Army Signal Corps has recently announced an "express" balloon that rises about twice as fast as conventional types. Its greater vertical speed means the new balloon is less likely to drift out of radio range during its ascent. It will also speed up observations.

Another possible development may be using a balloon to launch a man-made satellite. The present plan is to shoot the small moon into its orbit by a three-stage rocket. Later experiments, however, may possibly find balloons carrying satellites 15 miles up, from which point a rocket would shoot the spheres the remaining distance. This would save great amounts of fuel.

## Affects Your Life

In some ways, the balloon affects your daily living much more directly than you may think. Tomorrow's weather is predicted with the help of small balloons equipped with instruments for recording temperature, pressure and humidity. The information is automatically radioed down to meteorologists who use it in learning weather trends and for long range forecasts.

Striking success has been reported in launching rockets from balloons. The Deacon, launched from the General Mills Sky-hook Balloon at an altitude of 75,000 feet,

reached a height of 60 miles. The same rocket launched from sea level has gone up only 20 miles. The thinner atmosphere at 75,000 feet reduces friction to such an extent that rockets may fly far higher than if launched from sea level.

One of balloons' most interesting applications is in the field of cosmic ray measurement. When cosmic rays strike the atmosphere, the primary particles become ionized, and their nature is changed. They are then called secondary cosmic rays. To measure the original rays, balloons are sent up to heights of 120,000 feet where they can remain for as long as 10 hours. Instruments swinging beneath the Navy's loft-seeking giant sky-hook balloons are stealing secrets from cosmic rays 23 miles above the earth.

Often blamed for flying saucer scares, balloons actually vary greatly both in shape and in size. They can be pear-shaped or

nearly spherical, range from a minimum of one foot in diameter to a maximum of 200 feet. The balloons which recently aroused Russia were 39 feet across.

None of the airborne sacks has great lifting power. The biggest can carry a ton and a half to a height of 60,000 to 70,000 feet. The weather balloons that recently drifted behind the Iron Curtain traveled at about 50,000 feet, higher than commercial airplanes fly. If they remain too low, the balloons are automatically destroyed.

Weather balloons can be sent up in such great numbers that some become lost, accidentally penetrating the Iron Curtain even when extra precautions are taken. One reason so many of these airborne weather stations can be released is the cheapness of the material used. Modern balloons cost about one-fiftieth as much as their counterparts of 20 years ago. The weather balloons of yesterday were made of rubberized fabric that cost \$2.00 a square yard. The polyethylene plastic of many of today's floaters costs only four cents a square yard.

The Montgolfier brothers flew the first crude hot-air balloon in 1783, and soon



**BALLOON LAUNCHING**—A newly designed Air Force meteorological balloon is here being launched at Vernalis, Calif. The bag is being filled with gas just prior to its release.

daredevil sportsmen seeking thrills among the clouds became the first real pioneers of aviation. With their spectacular, sometimes inspiring, often clownish escapades, they lit new corridors of science.

Ballooning first aroused popular excitement in the early 1900's. By that time, hydrogen had succeeded hot air as the lifting agent. But hydrogen is highly inflammable, a drawback which culminated in disaster three decades later when the historic Hindenburg burst into flames killing 36 persons.

The great, shining plastic sacks of today are usually filled with heavier but non-inflammable helium.

Twenty-five years ago it was commonly believed that the balloon would outstrip the airplane as a commercial vehicle. In 1932 a metropolitan newspaper editorialized: "Climbing 10 miles into the sky, we shall soon fly from New York to Paris in 10 hours, safe from rarefied air in sealed cabins, while zooming along at dizzy speed of 400 miles an hour."

The story was referring to dirigibles.

## International Sport

During the first quarter of the 20th century, balloon racing became a sport of international scope.

The breakneck, cross-country races originated in France, but interest soon swelled to world-wide proportions. The first international race, held in October, 1906, started from Paris. The idea was to see how far the balloons could drift.

The balloons started westward, then veered to the north. Some landed along the French coast. Others drifted across the Channel to England.

This first race was won by an American, Frank P. Lahm, a U. S. Army lieutenant. Lahm landed near Scarborough, England, and brought home the coveted James Gordon Bennett trophy.

The development of heavier-than-air transportation, however, cost the sport of ballooning its popularity. Today the only balloons generally available for recreation can be bought on the street for a few cents.

Daring feats are still performed in the balloon world, but they are done in the name of science. Late this fall the Air Force plans to drop men by parachute from balloons 17 miles above the New Mexico desert. This will be twice as far as parachutists have ever jumped before.

The purpose of the experiment will be to obtain information for developing safe equipment and procedures for bailing out of fast, high-altitude airplanes.

Despite all its scientific uses, ballooning as a sport still survives. Balloon licenses are issued to the enterprising. If you wish to try a jaunt or two yourself, you must have at least six hours of instruction and pass a written test that covers meteorology, navigation and map reading.

Of course, you must also demonstrate your ability to pilot a balloon.

Science News Letter, April 14, 1956

# OPTICAL BARGAINS

## Photographers!

Adapt your camera to this Scope for excellent Telephoto shots and fascinating photos of moon!



... See the Stars, Moon, Planets Close Up!

## ASSEMBLE A BIG 100 POWER 3" REFLECTING TELESCOPE

... with this Complete 87 Piece "Do-it-yourself" Kit EXCELLENT SCIENCE CLUB PROJECT!

Get Ready to See the Artificial Satellites!

Everything you need! No machining! Easily assembled! We furnish complete, simple instructions. Kit includes: 3" f/10 aluminized and over-coated Spherical Mirror—60X Eyepiece and 100X Barlow Lens—Cross-line Finder—sturdy 40" Tripod—fork type Equatorial Mount with locks on both axes—ventilated 3" Mirror Mount—heavy wall, black Telescope Tube. All nuts and bolts supplied. Nothing extra to buy. Our 3" Spherical Mirror (30" f.l.) is guaranteed to resolve detail right up to theoretical limit. Your finished scope can also be used terrestrially. Money-back guarantee. Shipping weight, 10 lbs.

Stock No. 85,025-Q ..... \$29.50 f.o.b. Barrington, N. J.

## NEW! STATIC ELECTRICITY GENERATOR



See a thrilling spark display as you set off a miniature bolt of lightning. Absolutely safe and harmless—perfect for classroom experimentation—ideal for Science Clubs. Sturdily made—stands 14" high. Turn the handle and two 9" plastic discs rotate in opposite directions. Metal collector brushes pick up the static electricity, store it in the Leyden jar type condenser until discharged by the jumping spark. Countless tricks and experiments. Instruction booklet included.

Stock No. 70,070-Q ..... \$10.95 Postpaid

## SELENIUM PHOTO CELL AND SUN BATTERY

Requires no external power source for operation. Average sunlight striking the selenium layer of this cell will generate a current of 2 MA under a 10 ohm load. Low cost makes the sun battery an ideal component for experimental as well as actual applications in the photo-electric field. Overall size of cell .724" x .443" x .040". Active cell area .26 square inches. Direction sheet included—also a lens that may be used to collect light and focus it onto the selenium surface.

Stock No. 30,193-Q ..... \$2.50 Postpaid

## LOOK! NEW BOOK! 74 PAGES!

"The Uses of Selenium Photo Cells and Sun Batteries" contains technical information on self-generating devices, including many interesting applications such as light beaming, communication switch circuits, metering devices.

Stock No. 9230-Q ..... \$1.50 Postpaid

## INSTRUCTION BOOKLETS

Easy to follow—accurate—8 1/2 x 11 page size—many illustrations. Do-it-yourself—Save! and have Fun!

	Stock No.	Price Pstpd.
How to Build Projectors	9014-Q	30¢
Homebuilt Telescopes	9008-Q	40¢
Method to Clean Precision Optics	9024-Q	15¢
Homebuilt Riflescopes	9018-Q	40¢

## NEW—JUST ISSUED

How to Condense and Project Light with Lenses	9044-Q	75¢
Reticles and Their Uses	9039-Q	45¢
ULTRA CLOSE-UP Photography	9042-Q	60¢
Infra-red Light and Its Uses	9040-Q	75¢
Homemade Stereo-Adapters	9032-Q	30¢
Homemade Stereo-Viewers	9034-Q	30¢
Photo Micrography with Pea	9029-Q	10¢
Dummy Cameras	9035-Q	20¢
Collimating Systems	9047-Q	35¢
"Building a Condenser Enlarger"	9038-Q	40¢

"ALL ABOUT TELEPHOTO LENSES" 21 pages—wealth of information, diagrammed instructions. Tells how to build Telephoto attachments—how to use them. Lots of other good dope on Telephotography.

Stock #9038-Q ..... 60¢ Pstpd.

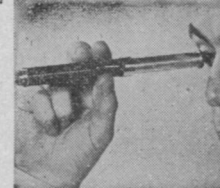
Order by stock No. Send Check or M.O. Satisfaction Guaranteed!

**EDMUND SCIENTIFIC CORP., BARRINGTON, N. J.**

## New! 2 in 1 Combination!

Pocket-Size  
50 POWER MICROSCOPE  
and  
10 POWER TELESCOPE

ONLY  
\$4.50  
ppd.



Useful Telescope and Microscope combined in one amazing, precision instrument. Imported! No larger than a fountain pen. Telescope is 10 Power. Microscope magnifies 50 Times. Sharp focus at any range. Handy for sports, looking at small objects, just plain snooping. Send Check or M.O. Satisfaction Guaranteed

Order Stock No. 30,059-Q ..... \$4.50

## SPITZ MOONSCOPE

A precision-made 32 power reflecting telescope by the makers of Spitz Planetarium. Clearly reveals the craters of the moon, shows Saturn, Jupiter, other wonders of the heavens. Based on same principles as world's giant telescopes. Stands 36" high on removable legs. Adjustable 3" polished and corrected mirror. Fork type Alt-Azimuth rotates on full 360° circle—swings to any location in the sky. Fascinating 18-page instruction book is included. Instrument packed in sturdy carrying case.



Stock No. 70,068-Q ..... \$14.95 Postpaid

## SPECIAL SALE 7x50 MONOCULAR

This is fine quality, American made instrument—war surplus! Used for general observation both day and night and to take fascinating telephoto shots with your camera. Brand new. \$95 value.

Stock No. 50,003-Q ..... \$15.00 Postpaid

## BUILD A SOLAR ENERGY FURNACE!

It's easy—inexpensive. We furnish instruction sheet. This sun powered furnace will generate terrific heat—produces many unusual fusing effects.

Stock No. 80,040-Q—Fresnel Lens, size 11 1/2" x 16 1/2" f.l. 19'

\$3.50 Pstpd.

## SIMPLE LENS KITS!

Fun for adults! Fun for children! Kits include plainly written, illustrated booklet showing how you can build lots of optical items.

Stock No. 2-Q—10 lenses ..... \$ 1.00 Postpaid

Stock No. 5-Q—45 lenses ..... \$ 5.00 Postpaid

Stock No. 10-Q—80 lenses ..... \$10.00 Postpaid

GET FREE CATALOG #Q—World's largest variety of Optical Items. Bargains galore... War Surplus—Imported—Domestic! Microscopes, Telescopes, Hand Spectroscopes, Prisms, Lenses, Reticles, Mirrors and dozens of other hard-to-get Optical Items. Ask for FREE CATALOG #Q.